AMENDMENTS TO THE SPECIFICATION

Please amend the paragraph on page 3, lines 3 to 8 as follows:

On the contrary, moving images in movies or television broadcasts that are edited by professional editors are provided with ~~varieties~~ a variety of visual effects. Compared to the results of these moving images that are familiar to the general public, results of the virtual editing tend to leave users wanting for more.

Please amend the paragraph on page 3, lines 10 to 14 as follows:

The object of the present invention, in view of the stated problems, is to provide an optical disc which can store moving image data, by which a variety of ~~modification~~ modifications at the transition between reproduction sections ~~is~~ are made possible, while a recovery is assured when the editing effort fails.

Please amend the paragraph on page 4, lines 3 to 12 as follows:

The above structure ~~enables~~ provides the ability to duplicate an end vicinity of a preceding reproduction section and a beginning vicinity of a subsequent reproduction section and to write the duplicated part to an optical disc, which enables a variety of ~~modification~~ modifications for a visual effect to this duplicated part. When the editing succeeds, the optical disc sets the flag on, by which the reproduction apparatus reproduces a part before the end vicinity of a reproduction section and a part after the beginning vicinity of a subsequent reproduction section via the duplicated part. This enables a user to reproduce the editing result.

Please amend the paragraph on page 4, lines 13 to 16 as follows:

When the editing fails or is not complete, the optical disc sets the flag off, by which the reproduction apparatus reproduces the preceding and subsequent reproduction sections without ~~via~~ the duplicated part.

Please amend the paragraph on page 4, lines 17 to 20 as follows:

The above structure assures the recovery when the editing fails, which increases the opportunities for users to ~~challenging for~~ provide a variety of editing techniques that involve modification.

Please amend the paragraph on page 4, lines 21 to 25 as follows:

Further, the duplicated part is limited to be the end vicinity of the preceding reproduction section and the beginning vicinity of the subsequent reproduction section, which does not increase the data amount which will cause the optical disc to be full in capacity.

Please amend the paragraph on page 8, lines 6 to 12 as follows:

The following is a description about an optical disc ~~concerning the~~ according to a first embodiment of the present invention with reference to the drawings. The optical disc ~~concerning~~ according to the first embodiment is a phase change optical disc. ~~Specifically~~ Specifically, the optical disc is assumed to be a DVD-RAM, DVD-RW(hereafter abbreviated as "DVD") and the like which can store moving image data in accordance with the DVD-video recording standard.

Please amend the paragraph on page 8, line 19 to page 9, line15 as follows:

Fig. 2A is a block diagram showing a hierarchical structure of a VOB contained in an AV file. A VOB(Video Object) is a program stream in accordance with an ISO/IEC13818-1 which is obtained by multiplexing a video stream and an audio stream. The VOB does not end with program_end_code. In Fig. 2A, the video stream situated in the first column is a sequence of picture data. A picture data sequence is divided into several GOP as depicted in the second column. Picture data divided in each GOP is then divided into 2KBytes. On the other hand, the audio stream situated on the right hand side of the first column is divided into 2KBytes as depicted as the third column. The picture data in 2KBytes and the audio stream in ~~2KByte~~ 2KBytes are interleave multiplexed to generate a pack sequence depicted in the fourth column. The pack sequence will then be grouped into several VOBUs(Video Object Units). A VOB depicted in the sixth column has a structure of arranging a plurality of VOBUs in chronological order. The dotted leader lines in Fig. 2A makes it clear about which part of the upper logical format corresponds to which part of the lower logical format. According to the leader lines, the VOBU in the fifth column corresponds to the pack sequence in the fourth column, and further to the picture data grouped into a GOP depicted in the second column.

Please amend the paragraph on page 9, line 22 to page 10, line 8 as follows:

Next, picture data included in a GOP is described. Fig. 2B shows an internal structure of a GOP. The picture data is converted into one from the group consisting of a bidirectionally predictive(B) picture, a predictive (P) picture, and an intra(I) picture. The B picture is

compressed using correlation with the image to be reproduced either before or after the picture. The P picture is compressed using correlation with the image to be reproduced before the ~~picture. And~~ picture, and the I picture is compressed using the spatial frequency response for one frame of image, without using correlations with other pictures. Picture data is displayed in about 1/33 second which is one display period (which is also called a video frame).

Please amend the paragraph on page 10, line 23 to page 11, line 10 as follows:

The VOBI(Video Object Information), as the dotted leader line hy2 shows, consists of a VOB type (VOB_Type), a reproduction starting time showing a time in which a reproduction of the first picture data included in the video stream ~~consisting~~ of the VOB (VOB_Start_PTM) starts, a reproduction ending time which shows a time in which a reproduction of the last picture data included in the video stream ~~consisting~~ of the VOB (VOB_End_PTM) ends, recording date/time information for the beginning of the VOB (VOB_REC_TM), a pointer which specifies, by an arrow Pr1, a particular VOB among the VOB STI#1···#K (VOB_STIN), and time map information for each VOBU which constitutes the VOB (TMAPI). The TMAPI includes, as the dotted leader line hy3 shows, TMAP_GI, TM_ENT#1~#S, and VOBU_ENT#1~#T.

Please amend the paragraph on page 12, lines 5 to 13 as follows:

Fig. 4 is a schematic diagram showing the relation between TMAPI and VOBU. As Fig. 4 ~~shows~~ shows, a correspondence between the reproducing time of each VOBU and the size of the VOBU are identified by the correspondence between VOBU_PB_TM(i.e. PB_TM in Fig. 4) and

VOBU_SZ. Further, TM_DIFF in each TM_ENT shows how many seconds after the reproduction of the VOBU starts it reaches where the time entry is. From the TMAPI structure as depicted so far, the VOBU that corresponds to an arbitrary time code is identified.

Please amend the paragraph on page 12, line 20 to page 13, line 8 as follows:

The CELL information (abbreviated as CELLI in Fig. 3) is pointer information showing the reproduction section specified as a result of a virtual editing operation by a user. ~~Specifically~~Specifically, in a virtual editing operation, the beginning of the reproduction section (In point) and the ending thereof (Out point) are specified. The CELL information includes VOBI_SRP which identifies the VOB, Cell_Start_PTM which shows a time code specifying the picture data, in the VOB, which corresponds to the In point, and Cell_End_PTM which is a time code specifying the picture data, in the VOB, which corresponds to the Out point. The time code has the same accuracy in time as the video frame which is the display period of the picture data. The CELL information has the same accuracy in time as the video frame accordingly.

Please amend the paragraph on page 13, line 9 to page 14, line 3 as follows:

The order of the pieces of CELL information in the Playlist information shows the order of the reproduction sections. That is, if the Playlist information includes CELL information in an order of CELL information #1, #2, #3, the corresponding reproduction sections #1, #2, and #3 are to be reproduced in the order of #1, #2, #3. Fig. 5 is a schematic diagram showing how a reproduction section is specified by the CELL information #x, #x+1. As Fig. 5 shows,

reproduction sections are defined by a three layer structure; VOB-VOB information-CELL information. For example, if an assumption is made that for the CELL information #x in Fig. 5, a user sets an In point and an Out point corresponding to the reproduction section #x, and that for the CELL information #x+1, the user sets an In point and an Out point corresponding to the reproduction section #x+1. VOBI_SRP included in the CELL information #x specifies VOB#x through the VOB information #x, as the arrow vy1 shows. Cell_Start_PTM in the CELL information #x, as the arrow vy2 shows, shows the In point for the reproduction section #x. Finally, Cell_End_PTM in the CELL information #x shows the Out point for the reproduction section #x, as the arrow vy3 shows.

Please amend the paragraph on page 14, lines 13 to 19 as follows:

The picture data specified by the CELL information includes a plurality of picture data compression-encoded according to a MPEG standard based on the between-frame correlations. This compression-encoding operation assumes that all the pieces of picture data ~~consisting~~ of the VOB(VOBU)are reproduced sequentially from the beginning.

Please amend the paragraph on page 14, line 20 to page 15, line 7 as follows:

On the contrary, a sequential reproduction of more than two reproduction sections as depicted in Fig. 5 in such a way that the picture data at the end of the preceding reproduction section and the picture data at the beginning of the subsequent reproduction section are sequentially reproduced are against the assumption stated above. Therefore, it is difficult to

sequentially reproduce a plurality of reproduction sections specified by Playlist information. ~~Accordingly~~ Accordingly, interruption in the moving images occurs frequently between the preceding and subsequent reproduction sections. This means that every time the reproduction section switches from one to another, interruption occurs in the reproduced images. The editing result defined by Playlist information will be as if it were a patchwork quilt with interruptions here and there.

Please amend the paragraph on page 17, lines 5 to 11 as follows:

Note that the modification in this specification includes other modification techniques than that yielding visual effects that make the resulting transition between reproduction sections look more smooth. These other modification techniques include such techniques as [[a]] computer graphics, a synthesizing of animation, adding of superimposing text, and so on, all of which are transactions that involve data operations for VOBs.

Please amend the paragraph on page 17, line 24 to page 18, line 13 as follows:

The reason why the assumption is made that the end vicinity includes up to the second VOBU ahead to be encoded, is that to maintain the synchronizing reproduction between the audio data. Since picture data is compression-encoded in relation to other picture data, the picture data will not be reproduced immediately after when read from the DVD, but has to wait after the subsequent picture data is reproduced. Therefore, the picture data will be stored in a buffer inside the reproduction apparatus until it is reproduced. The maximum time period that the picture data

is stored in the buffer is 1 second. On the other hand, audio data will not be stored ~~on~~ in the buffer, or when it ~~does~~ is, the time period is very short. Thus, the picture data stored in the GOP sometimes will be reproduced at the same time as the audio data read from a DVD 1 second later than the picture data is read out.

Please amend the paragraph on page 19, lines 7 to 12 as follows:

On the other hand, as Fig. 7A ~~depicted~~depicts, in such a modification as a fade-out connection, a fade-in connection, or a cross-fade connection, the end vicinity includes a VOBU which is *j*th VOBU from the VOBU including the Out point in a backward direction, and the beginning vicinity includes a *k*th VOBU from the VOBU including the In point in a forward direction.

Please amend the paragraph on page 24, line 23 to page 26, line 2 as follows:

Trimming_End_PTM is a time code showing the picture data situated immediately before the end vicinity. The Trimming_Start_PTM and the Trimming_End_PTM helps evade the overlapping of the same content when reproducing via the Temp_Cell information. That is, the Out point and the In point that a user specifies overlap each other, since the Cell_End_PTM of the CELL information #x specifies the Out point for the end vicinity of the duplicated part, and the Cell_Start_PTM of the CELL information #x+1 specifies the In point of the beginning vicinity of the duplicated part, which means that a part from the beginning of the end vicinity to the Out point, and a part from the In point to the end of the beginning vicinity will overlap in

reproduction. To deal with this problem, the embodiment is equipped with Trimming_End_PTM and Trimming_Start_PTM in order to ~~specific~~ specify the picture data situated immediately after the beginning vicinity and the picture data situated immediately before the end vicinity. In Fig. 11, Cell_End_PTM of the CELL information #x specifies the range framed by the dotted line bs1. On the other hand, Trimming_End_PTM of the CELL information #x specifies the last picture data of the VOBU#(PreEdge)situated immediately before the end vicinity, as shown by the arrow gy1. Likewise, the Cell_Start_PTM of the CELL information #x+1 specifies the range framed by the dotted line bs2. On the other hand, the Trimming_Start_PTM of the CELL information #x+1, as shown by the arrow gy2, specifies the beginning picture data of the VOBU#(PostEdge). The stated "immediately before" and "immediately after" specification is made so as to evade the overlapping in reproduction, when reproduction is performed via the Temp_Cell information.

Please amend the paragraph on page 26, line 20 to page 27, line 9 as follows:

Temp_Cell_FLAG, when set to be "0"(i.e. off), shows a direct reproduction according to the subsequent CELL information without referring to Temp_Cell information. And when set to be "1"(i.e. on), it instructs to refer to Temp_Cell information before referring to subsequent CELL information. Two examples in which Temp_Cell_FLAG is set to be "0" are 1)when enough free space on a DVD is not guaranteed for writing the duplicated part, and 2)even if there was enough free space for writing the duplicated part, the result of the modification such as re-encoding and so on has turned out to be poor, and a user does not want the reproduction

thereof. On the contrary, an example in which Temp_Cell_FLAG is set to be "1" is that when the modification for the duplicated part has turned out to be a success, and a user would like to refer to the Temp_Cell information which specifies the modified duplicated part.

Please amend the paragraph on page 28, lines 10 to 21 as follows:

The above embodiment enables duplicating the end vicinity of ~~an~~ a preceding reproduction section as well as the beginning vicinity of a subsequent reproduction section, and writing the duplicated part on a DVD for modification purposes. This enables modification techniques yielding a variety of visual effects for the duplicated part while maintaining the principle of the virtual editing. When the editing succeeded, the reproduction of the duplicated part is realized by making the temp_Cell_FLAG for the CELL information set to be on. This enables a smooth reproduction of the reproduction section sequence specified by the Playlist information, without interruption during reproduction.

Please amend the paragraph on page 48, lines 5 to 11 as follows:

The MPEG encoder 20 encodes the uncompressed picture data written on the editing result storage unit 13, in order to obtain VOB#z and #z+1, and ~~output~~ outputs them to the track buffer 5. The picture data outputted to the track buffer will be stored, in correspondence with the VOB information and the Temp_Cell information in the DVD, under control of the Playlist writing control unit 14 stated earlier.

Please amend the paragraph on page 57, line 6 to page 58, line 2 as follows:

The ninth embodiment relates to a recording apparatus performing a modification taking into account the recording capacity of a DVD. In the second embodiment, every time a virtual editing is performed, the duplicated parts at the end and beginning vicinities are written on a DVD. This means that if the virtual editing is repeated and many pieces of CELL information is generated, the capacity of the DVD will be reduced accordingly. This increases the possibility that the optical disc becomes full. Taking this problem into account, the ninth embodiment is structured to display, to the user, whether the disc allows the modification. Only when the user's answer is positive to the modification, the modification mode is set for the recording apparatus. On the contrary, if the user's answer is not positive to the modification, then the non-modification mode is set. The recording apparatus according to the ninth embodiment is structured to perform the modification described in the second embodiment, only when the apparatus is set to be a modification mode. When the non-modification mode is set to the apparatus, the recording apparatus of the present embodiment does not perform the modification of the second embodiment. This structure enables to write many other VOBs in a DVD than the second embodiment.

Please amend the paragraph on page 58, lines 15 to 19 as follows:

This is the end of the description of all the embodiments. Note that the above are only examples of systems that can be hoped to yield the best effects. Therefore, the modifications within the scope of the purpose of this invention are possible. A representative modification examples include the following (A), (B), (C), and so on.